MARINE SKILL REPORT SUBMITTED TO THE

UNIVERSITY OF HAWAII MARINE OPTION PROGRAM

Marine Education Internship: Designs of a Divemaster A Synopsis of my Role in MOP's Evolving Transecting Workshops

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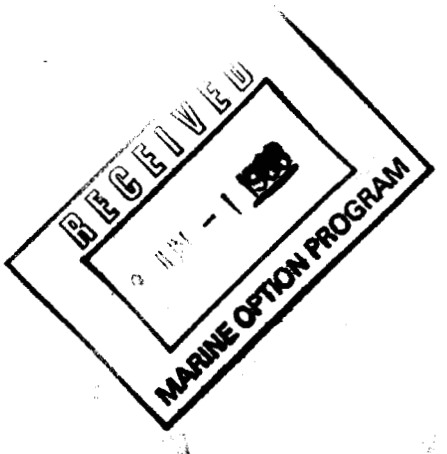

My involvement with the Marine Option Program (MOP) has been as student and diving instructor since I joined in September 1983. It has been my good fortune to be associated in both capacities, but it has also been very difficult at times. This report, more in the form of an essay, will summarize my role as diving instructor. Specifically, it will focus on my involvement as divemaster for MOP's transecting workshops.

From 1984 to 1986 I divemastered a yearly course titled Maui Transecting Workshop (MTW) in '84 and '85, and Hawaii Transecting Workshop (HTW) in '86. The title reflected the island on which the training was held. Initially, my involvement was a convenient means of circumventing the difficult and expensive U.H. Diving Regulations. By contracting me to provide services for the workshop, the program would be exempt from U.H. regulations via my professional liability coverage. This not only freed the program, it also allowed more students access to the workshop. However, this left me in a gray area. I had no experience in the transecting methods being taught, I didn't know any of the biota identifications, I had never worked with the staff before, and my contract didn't define my position as it should have. Consequently, in 1984, I was of dubious value to the staff, and of little or no use to the students. By the end of the workshop I was feeling more like an impedance than an asset. It was very frustrating to be responsible for so many people and yet not have the authority to implement the responsibility. Things did not go well and although I felt I could make a difference, the difference would have to wait until the next workshop.

When the 1985 transecting workshop was being contemplated, I asked to be a part of the organization. I had identified a component of the difficulty and wanted to try a new approach. I suggested two changes. First, I wanted to change the promotion from "Dive Maui Over Spring Break," to something with less of a recreational connotation. The new workshop didn't have a catchy slogan, but it did suggest that science was the objective and diving the tool for data collection. This attracted students less inclined toward spearfishing and underwater photography, and more toward the goals of the workshop: identification of the nearshore marine ecological environment by data collection, analysis, and reporting of the information. Second, the actual dive teams needed better organization and support. Each team was headed by a student who was a workshop vetran. This requirement, to me, seemed insufficient to insure proper supervision of five or six first time workshop divers. Called Dive Team Captains, many of the student leaders were ineffective in carrying out their responsibility. It wasn't necessarily their fault though because they had received no formal training in leadership. Most, in fact, didn't understand what was expected of them. In the spring of 1985, I designed and conducted a special course titled "Dive Team Leader." The objective of the course was to identify those students who naturally aspired to the responsibility given the captains or leaders at the workshop .

Via diving skills evaluation, rescue skills presentations, hands-on transecting dives where the interested students could organize and execute the training, and classroom lectures covering what was expected of a student leader and how he or she might implement the position, students were selected for leadership positions based on interest, performance, and commitment. The short pre-workshop course (only three days long) was offered prior to the '85, '86, and '88 workshops. There was no full size workshop in 1987.

Although the Dive Team Leader course, designed to complement the workshop, was being constantly changed and developed, it seemed to fulfilling its intention. Students at the workshops were being led by other students who wanted to be leaders. These leaders were aware of what was expected of them and had some experience in working with me directly. It was a combination of these and other elements that helped make MTW '85 and HTW '86 the success that they were.

With each year my role in the organization was being more closely defined. This made it easier for me to fulfill the responsibilities, increasing as they were, of the workshop divemaster. Beginning in 1985, I was integrating with the staff and the students. As it went, mostly what I did was orchestrate diving logistics and provide a liaison for the divers. In this way I had a specific role and felt less resistance than in 1984. For 1985, the workshop worked better than before because not only did we have a common goal, we had a common understanding.

As a result of my continued involvement with the training of undergraduates in the MOP workshops, Dr. Sherwood Maynard allowed me to co-author a paper on our transecting program. In the fall of 1985, I traveled with Sherwood to a conference held at Scripps Institute of Oceanography, University of California at San Diego, La Jolla, (CA). There, we co-presented the paper to an assembly on individuals sharing common interests in the marine environment. It was the first opportunity I had to see other schools' diving programs and approaches to collegiate level marine science education. I attended many of the sessions and was exposed to myriad methodologies for conducting underwater research. Part of the conference was just plain fun. I operated an unmanned Remotely Operated Vehicle (ROV) and probed the esotericies of the deep-end of our hotel's pool. However, the exposure to the knowledge and practicies of several of the other school's Diving Safety Officers (DSO), Diving Medical Officers (DMO), researchers and support personnel, proved to be most rewarding aspect of the trip to Scripps. (Appendix 1)

In 1986 the workshop moved to the big island of Hawaii. Basing at Hawaii Preparatory Academy (HPA), Waimea, Hawaii was a giant social step up for this humble enterprise. Compared to the atmosphere at Maui's Camp Pecusa, with its homely "A" frame cabins and cook yourself, clean up after yourself way of life, HPA was resort style workshopping. For the

first time in the history of the workshops, students had only to concentrate on the science. Traditional dive team duties included meal preparation, serving, clean up, and getting empty SCUBA tanks filled daily. HPA took care of the meal duties and the tanks were picked up empty and returned full each day. There were only two setbacks. The dive sites were a minimum 30 minute drive one way, and the cost for the accommodations and services while reasonable, was prohibitive for our budget. These things aside, however, the move to the Big Island was a good one.

At HTW my role was yet somewhat different than in years past. I had become defined in a close support position. It worked well for me, the students and staff. I even had an assistant to share the workload with. Between the two of us we managed to transport two boats, the divers' gear, food for the time away from camp, and personnel to the remotest dive sites on Hawaii. I became involved in much of the behind the scenes activity that keeps this type of project on schedule. For the first time since my initial workshop in 1984, I was completely a part of the organization and was content with not only the contract, but the job as well. HTW was as close to the plan for it as was any workshop I'd been involved with. It was one up on MTW '85.

The full workshops were given a break in 1987. A smaller version was held at Hawaii Institute of Marine Biology, Coconut Island, Oahu. This scaled down crash transecting course was to be a first run with the new U. H. Diving Regulations. U.H.'s DSO, Edwin Hayashi supervised. I wasn't needed and didn't find out about the course until it was over. Within the functioning diving regulations, my contract advantage became moot and I didn't fit into any position.

In 1988, however, there was to be another full workshop. Windward Community College MOP Coordinator, Dr. Dave Krupp, asked me to participate in a capacity similar to past workshops. I had learned a great deal about MOP and its transecting programs since my days as a recreational instructor in 1983. I had a grasp of the strengths and weakness of the workshop and it was felt I could again make a viable contribution to the success of another workshop. (Appendix 2) Titled the Quantitative Underwater Ecological Surveying Techniques (QUEST) Workshop, the '88 training would base at Hawaii Institute of Marine Biology, Coconut Island, Oahu. Dave wanted me on board to manage the diving operations and to interpret the U. H. regulations for him. It would have given me the opportunity to not only work administratively, but personally with the divers as well. I wanted QUEST to be the best organized, most successfully run workshop ever. I also wanted to move ahead with increased responsibility and to become a necessary part of this and future transecting projects. After five years, it seemed like I could be the positive component I had always wanted to be. Unfortunately, my ambitions ran beyond those Dave had for me.

For reasons beyond this paper, I was dismissed by Dave personally. Regretfully, I was not allowed to participate in the QUEST Workshop. Since that time I've come to understand more about myself, the Marine Option Program, and why I didn't complete Dave's workshop. What I can so with my talents and knowledge when coupled with my aspirations is, to a large extent, a function of my proud association with the Marine Option Program.

I'm no longer a part of the transecting workshops. However, I will continue to strive toward a better understanding of how to safely employ the methods of diver training I've been able to witness and design through MOP. Someday, perhaps, I'll be asked to head a transecting workshop or a similar endeavor. From what I've learned, and who I've worked with at MOP, I know that I'll confidently execute that commission.

UNDERWATER TRANSECT TRAINING BY THE UNIVERSITY OF HAWAII MARINE OPTION PROGRAM

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Mitchell, C.T. (ed.). 1985. Proceedings of Joint International Diving Symposium. October 31, 1985 to November 3, 1985. La Jolla, California, U.S.A. American Academy of Underwater Sciences, La Jolla. 330 pages.

The Marine Option Program (MOP) is an experiential education program for undergraduates in the University of Hawaii statewide system. Students earn a certificate by completing a core of marine courses along with an internship or independent study project of their choice. MOP also promotes ocean learning through seminars, field trips and workshops. One theme prepares students to conduct scientific surveys of Hawaii's coral reef ecosystems. During fall and spring semesters, courses are offered in scuba, first aid, CPR and the field identification of fishes, corals, invertebrates, and algae. Those students who successfully complete this instruction participate in a week-long workshop on transecting methods at a shoreside camp. Evening lectures by professionals and experienced MOP students cover reef biology, sampling theory, data analysis, and detailed method descriptions. The following day, these methods are put into practice in the water, with data worked up the following night. The students train in six-member teams which include a dive captain and safety diver who have completed a three-day Dive Team Leader course. Graduates of the transecting workshop have made valuable contributions to baseline surveys conducted throughout Hawaii and the Pacific by governmental and private agencies. Many have received academic credit and/or employment based on this training.

INTRODUCTION

The University of Hawaii Marine Option Program (MOP) serves undergraduates throughout the nine-campus statewide system with a broad spectrum of experience-based educational programs (Maynard 1984). About 400 students from more than 60 fields of study are enrolled to learn about the ocean above and beyond what is offered in the traditional classroom and laboratory setting. The most diligent earn a certificate by completing 9-15 credits of marine-related courses and an internship or independent study project. Many other MOP students participate only in the workshops, field trips, seminars, or non-credit classes. Many are interested in learning more about Hawaii's coral reef ecosystem, either in pursuit of their careers in marine science, or to satisfy their personal curiosity. In order to promote these interests, MOP has

sponsored workshops in conducting underwater surveys of the nearshore environment using scuba. Graduates have acquired a rudimentary, practical introduction to a variety of baseline methods as well as an appreciation for the demands of fieldwork, team cooperation, and data analysis.

During the school year students prepare for the workshop by taking non-credit classes sponsored by MOP in the identification of nearshore marine organisms. In addition certification is obtained in first aid and cardio-pulmonary resuscitation. The workshop is held on Maui at the end of Spring Semester and students carry out a variety of projects utilizing their new skills during the summer.

PRE-WORKSHOP PREPARATIONS

Initial Planning

During the statewide staff meeting at summer's end, plans for the Maui Transecting Workshop (MTW) are roughed out. At the beginning of Fall Semester new students are recruited into the workshop preparation sequence through talks on each campus by MOP staff and students who have attended previous workshops. A slide show outlines the qualifying steps and illustrates workshop activities as well as some of the post-workshop projects which training makes possible. In addition the workshop is promoted through our biweekly newsletter Seawords. Those who respond from the Oahu campuses are organized into several committees which are supervised either by the MOP Director or the Manoa Coordinator (Table 1). These groups meet periodically to organize and plan the program, training, and logistics. Concurrently MOP staff begin to develop funding proposals for summer projects.

Courses

To make the best use of time while on Maui, students are expected to know how to identify reef organisms prior to attending the workshop. Faculty, staff and experienced MOP students on the four MOP campuses (Manoa, Hilo, Windward, Maui) conduct non-credit courses which prepare potential MTW students in the field identification of the species most likely to be encountered. The classroom portion of the classes is usually conducted in the evening and includes basic structures, terminology, systematics and taxonomy, a slide presentation of each species in its natural habitat, examination of specimens, and a brief discussion of each species' natural history. Students learn scientific, common, and Hawaiian names for about 40 species of fish, 30 species of benthic algae, 20 species of coral and 25 species of other benthic invertebrates. These sessions are complemented by field trips to the Waikiki Aquarium, Sea Life Park, Coconut Island, and the Hanauma Bay Marine Life Conservation District for snorkeling surveys. Analogous courses are conducted at the Maui and Hilo campuses. For admission to the workshop, students must pass an examination with a score of at least 80% correct. The ability to accurately identify organisms must be thoroughly established before a successful workshop can be conducted. The pre-workshop courses filter out those students not seriously interested in the program.

To insure a safer workshop, in addition to a nationally-recognized scuba certification card, each student must have completed an introductory course in first-aid and CPR. MOP sponsors several of these each year.

TABLE 1. Committees for Organizing the Maui Transecting Workshop

1. PROGRAM: design lectures and dives, organize daily schedule, engage and schedule speakers, prepare abstracts/outlines/handouts/study questions/exams.

2. PERSONNEL: compile information on potential participants, document certifications, record tuition payments, contact as needed, disseminate pre-workshop information.

3. FOOD: develop menu, purchase food, pack food for shipment from Oahu, supervise food preparation.

4. EQUIPMENT: collect and inspect all equipment and supplies needed to conduct workshop (borrow, rent or buy as needed), pack and list equipment for shipment, maintain inventory control during workshop, make repairs as needed, repair and return equipment after workshop, assemble and maintain repair and first aid kits.

5. TRANSPORTATION: Arrange ground transportation for personnel and equipment on all islands, schedule air transportation of all personnel and equipment.

6. FUND RAISING: develop proposals for funding, coordinate special fund raising projects.

7. LOCAL ARRANGEMENTS: assist Oahu staff with local contacts, secure as much of the equipment and supplies as possible on Maui, meet planes.

8. WORKSHOP DIRECTOR: provides overall coordination, obtains necessary permits, develops budget and monitors expenditures, organizes pre-workshop courses, collects tuition, hires cook, submits final reports.

9. INFORMATION PACKET: develops packet of materials to be handed out at workshop, develops evaluation form, collects all correspondence and documents pertaining to workshop for assembly into workshop handbook, collects materials for reference library which is taken to workshop, compiles evaluation results.

10. DIVEMASTER: develops waterfront protocol in coordination with program committee, inspects and repairs scuba gear, makes dive team assignments with director, arranges class certification with NAUI.

All training dives on Maui are conducted with students assigned to six-member dive teams. Each team is supervised by a Captain and a Safety Diver. These individuals are chosen by MOP staff and the Divemaster based on their diving experience and participation in previous workshops. In 1985 the authors designed a three-day workshop to prepare these Dive Team Leaders (Table 2). The first day was spent in the classroom and covered elements of effective leadership, responsibilities of the dive team leaders, an overview of the workshop program, planning the dives, transecting methods, and general organizational principles. The second day consisted of two dives which reviewed basic scuba skills and practice rescues. The third day introduced the candidates to the transecting equipment in the water as well as an opportunity to lead a dive. Based on their performance in the water, at the shore, and on a written exam, five dive team captains and five safety divers were selected. This training contributed significantly to smooth waterfront operations at the workshop. The 14 graduates each earned a NAUI specialty card in "Research Dive Team Management".

TABLE 2. Dive team leader course outline

I.	Objectives
II.	Methods and Materials
III.	Elements of Effective Leadership
IV.	Overview of the Maui Transecting Workshop
V.	Role of the Dive Team Leader
VI.	Establishing a Protocol
VII.	Being a Conscientious Diver
VIII.	Types of Dives
IX.	Typical Dive Considerations
X.	Preparing a Dive Plan
XI.	Presenting a Dive Plan
XII.	Executing a Dive Plan
XIII.	Post-Dive Responsibilities
XIV.	Decisionmaking and Authority
XV.	Transecting Methods
XVI.	Dive One: Equipment Ditch & Retrieve
	Bail Outs
	Sharing Air
	Ledge Exits
XVII.	Dive Two: Underwater Problem Solving
	Diver Rescue
XVIII.	Dive Three: Practice Transecting Methods
	Practice Roles of Captain and Safety Diver
XIX.	Dive Four: Continue Transects & Roles

Logistics and Finances

The workshop is designed for 30 students, five staff in residence, and five guest lecturers. The duration is seven to ten days with the venue at a church camp, Campu Pucusa, on the beach at Olowalu, Maui (Figure 1). Six A-frame cabins accommodate six persons each in addition to two separate rooms for six staff. A large mess hall with full kitchen doubles for a classroom and equipment locker. The shallow reefs offshore provide excellent training in the initial phases of the workshop, and a small channel through the reef allows boat access to deeper waters. Situated in the lee of the island, the waters are usually quite protected and calm. Rental is inexpensive and several dive shops are conveniently located in Lahaina, about a ten minute drive from the base camp. The Kahului Airport is about 45 minutes distant, and some two dozen excellent dive sites are within an hour and a half's drive. Most of the equipment (scuba, transecting, inflatable boat with outboard motor, library, etc.) is flown over from Oahu along with dry stores and paper goods. Usually 100-150 pieces of baggage accompany the entourage in flight. Local purchases include fresh produce - meats - dairy products, air fills, car and truck rentals, and miscellaneous supplies. Some equipment is borrowed from Maui Community College.

A ten day workshop for 30 students costs about $15,000 or $500 per student. Each student is expected to pay $300 of this amount. Those who work on committees receive some or all of their airfare in compensation and thereby reduce their tuition. Others pitch in on the fundraising projects, proceeds of which are split between a general fund and the individuals. The balance of the financing comes from MOP's regular budget. Operating revenues are provided by the University of Hawaii, the University of Hawaii Sea Grant College Program, and the State Department of Planning and Economic Development -- Ocean Resources Branch. In 1985 about 13% of the workshop budget came from a

student-staff solicitation in the community for scholarship money. This also substantially raised the program's visibility on and off campus and led to media coverage which in turn produced contacts for summer surveys.

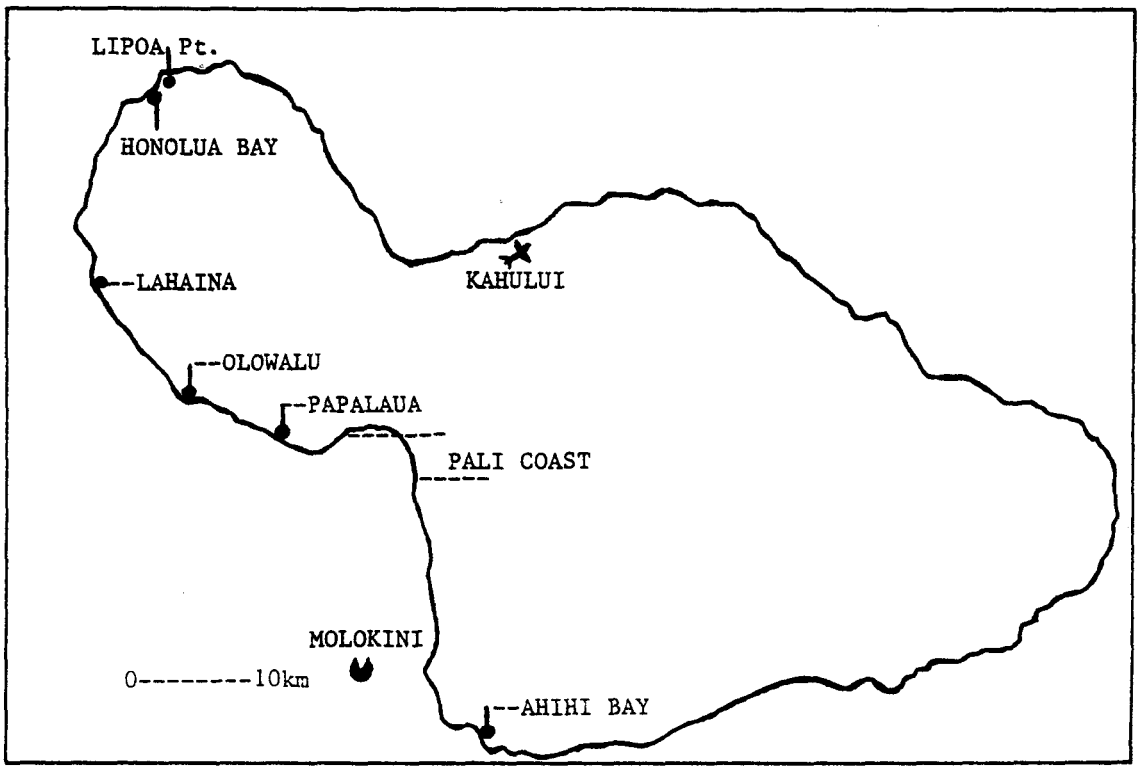

FIGURE 1. The island of Maui showing dive sites and points of importance.

WORKSHOP PROGRAM

Objectives

The workshop is designed to introduce MOP students to the principles and techniques of surveying and cataloging the components of Hawaii's nearshore marine environment. For some, this introduction will lay the foundation of research tools needed for advanced studies and marine careers. Others will leave the workshop with enhanced appreciation of the ocean and sharpened observational skills which will contribute to their diving enjoyment. All will gain from the less tangible -- a sense of MOP community, new friendships, teamwork and pride of accomplishment.

Format

The program is a combination of lectures, diving, written exercises and shared "housekeeping/maintenance" (Table 3). Early lectures cover the philosophical underpinnings and the significance of coral reef studies and the contributions that can be made by scientists using scuba gear. The simpler

survey methods are taught first, giving the students a chance to get used to working in a dive team. (The team's cohesiveness is reinforced by bunking together and rotating responsibilities with the other teams for meal preparation and clean up, grounds patrol, latrine duty, and air fills.) Typically a method lecture is presented in the evening illustrating a survey technique with slides and hand-on exercises in the classroom or on the lawn (Figure 2). Data sheets for the method are distributed, and students practice filling them out. The following day the method is carried out during a diving exercise. Normally two or three teams dive at the same time for about an hour in the water. Once they exit, the remaining teams enter for their exercise. One method will be practiced during the morning and another during the afternoon. The lecturer for each method designs an in-water teaching plan which is carried out by the captain of each team. The Divemaster supervises waterfront operations and logs each diver's entry and exit. Upon leaving the water and cleaning up its gear, the dive team transcribes its data from the waterproof sheets on the clipboard to xerox copies of the data sheets. That evening in the classroom the students are shown how to analyze, plot, and interpret their data with elementary statistics. As the week progresses, dives are conducted at sites away from Camp Pecusa and include multiple methods. A diversity of sites is selected to provide experience with a variety of habitats and diving modes, as well as to continue established time series data collection for environmental monitoring. Each team presents its findings to the class and relates its contribution to the ecosystem description being pieced together.

FIGURE 2. Students with quadrat on lawn at Camp Pecusa practice transect methods before diving.

TABLE 3. Daily program of the Maui Transecting Workshop.

Day 1.	Advance party of dive team leaders and food staff arrives with most equipment, sets up camp, and gets oriented.
Day 2.	Students and balance of staff and equipment arrive.
	Classroom: Introduction
	Getting to Know Each Other
	Diving Protocol & Dive Team Organization
	Dive Gear Maintenance
	Dive One: Check Out/Navigation at Olowalu
	Classroom: Coral Reef Biology
	Data Collection Principles
	Grid and Point Quadrat Methods
Day 3.	Dive Two: Point Quadrat Method at Olowalu
	Dive Three: Grid Quadrat Method at Olowalu
	Classroom: Statistical Analysis
	Geomorphology Methods
	Analysis of Grid and Point Quadrat Data
Day 4.	Dive Four: Geomorphology Methods at Honolua
	Classroom: Analysis & Plotting Geomorphology Data
	Mollusks
	Underwater Photography--Operating NIKONOS
Day 5.	Classroom: Photo Quadrat Method
	Dive Five: Photo Quadrat Method at Camp Pecusa
	Classroom: Molokini & Other Maui Dive Sites
	Fish Transect Methods
	Division of Aquatic Resources Surveys
Day 6.	Dive Six: Fish Transects at Molokini
	Dive Seven: Fish Transects at the Pali
	Classroom: Analysis of Fish Survey Data
Day 7.	Classroom: Towing Survey Methods
	Night Diving Protocol
	Night Survey Methods
	Dive Eight: Towed Snorkel Survey at Pecusa
	Classroom: Diving Medicine
	Sharks
	Dive Nine: Introductory Night Dive at Pecusa
Day 8.	Classroom: Ahihi Bay Natural Area Reserve
	Dive Ten: Comprehensive Survey at Ahihi
	Dive Eleven: Ahihi Survey Continued
	Classroom: Analysis of Ahihi Data
	Analysis of Photo Quadrat Data
	Underwater Trails and Other Projects
Day 9.	Classroom: Fish Feeding Behavior
	Dive Twelve: Diurnal, Crepuscular, & Nocturnal
	Fish Feeding Patterns at Papalaua
Day 10.	Classroom: Analysis of Fish Feeding Data
	Dive Thirteen: Comprehensive Survey at Lipoa Point
Day 11.	Written Exam, Evaluation, Pack and Return Home

Transecting Methods Taught

Fish surveys were conducted using a modified Brock method (V.E. Brock 1954, R.E. Brock 1982) whereby two divers swim on either side of a 50-m line laid along the bottom and each records the fish encountered in a volume 2.5 m to his or her side of the line and 2 m above the bottom. A second fish method (Jones and Thompson 1978) requires one diver of a pair to mark one-minute time intervals while the second records fish observed and assigns them decreasing ranks in successive intervals during a ten-minute swim along the transect. The transect line is white nylon, marked in one-meter increments, spooled on a small wooden frame, with a one-kg lead weight tied on one end. (See also Gotshall et al. 1982).

Surveys of the substrate and attached organisms also involve setting a transect line (Figure 3). At intervals chosen with a random number table, a quadrat is positioned to obtain a "sample". In the grid and intersect quadrat methods a lead-weighted PVC frame, divided into subunits by string (or wire or monofilament), is laid on the substrate (Figure 4). In the former the percentage cover of each substrate species/type is estimated for each square (Reed 1980;82). For the intersect method only those species beneath the intersects of the dividing wires are recorded (Doty 1969). A quantitiative photographic record may also be made with a camera mounted on an aluminum frame about one-meter above a quadrat base (Reed 1980; Figures 5-8). The area of most quadrats ranges from one half to one square meter.

FIGURE 3. MOP student deploying transect line.

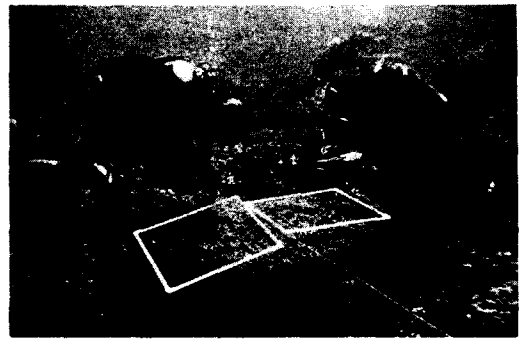

FIGURE 4. MOP divers using quadrats to quantify substrate on either side of a transect line.

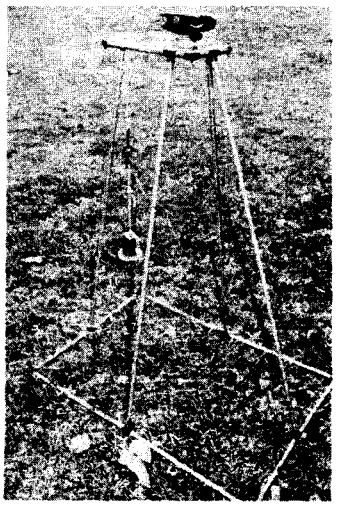

FIGURE 5. Photo quadrat frame with NIKONOS III and light meter.

FIGURE 6. Students become familiar with operation of photo quadrat system on the beach before entering water.

FIGURE 7. One diver photographs substrate along transect line while buddy records field notes.

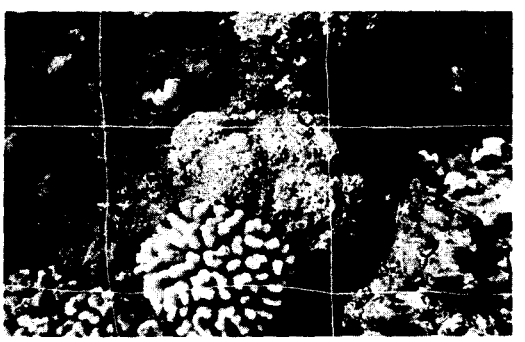

FIGURE 8. Record of substrate using photo quadrat system.

Geomorphology surveys required laying of transect lines of 200-m lengths along compass headings carefully aligned with landmarks (for reference to maps, charts and aerial photos). At five-meter intervals from the shoreline, depth and substrate are recorded. Afterwards a composite of bathymetry and substrate can be contoured on an outline map.

A contoured-fiberglass tow board was designed for the 1985 workshop by MOP student Rex Miyashiro. Snorkelers were towed over depths of 5-15 m for ten minutes and, upon returning to the tow boat, recorded relative abundance of substrate and fishes observed. Previous designs of tow boards incorporated a means to secure data sheets for recording underway. This survey

technique permits rapid qualitative assessments and identifies important areas for detailed transecting.

Feeding behavior was quantified by identifying and tracking an individual fish for about 50 minutes. For each five-minute observation interval the diver records each prey type, the number of "feeding bouts" with each prey type, and the depth of the observation.

All methods require data recording underwater. We designed our own recording format for each method and have them printed on Nalgene^{R} PolyPaper ^{TM} (Cat. No. 6304-0811) which is 21.6 cm x 27.9 cm. They are secured to a slightly larger slate of 64-mm thick white plastic with two short bolts holding a plastic strip across the top of the page and two wide rubber bands holding two edges. A ruler is glued to the back, a pencil is secured with a short piece of line and a swivel-snap hook attaches the board to a ring on the diver's belt.

POST-WORKSHOP ACTIVITIES

Students are evaluated by written examination and by their performance in activities in and out of the water during the workshop. Those performing satisfactorily earn a NAUI specialty card as "Research Divers". Students in turn evaluate the workshop with a questionnaire and during a staff/student roundtable held one or two weeks after returning from the workshop. A handbook is compiled to document all phases of the program and facilitate preparation of the next one. Contents include the information packet, pre- and post-workshop correspondence and documents, evaluations, and a financial statement.

The best students are then competitively selected to participate in a summer practicum which allows them to apply their new skills in a real situation. Historically the summer projects evolved from the National Science Foundation's Undergraduate Student Originated Studies Program. The transecting training was neither as extensive nor as intensive as MTW and was usually limited to about a dozen students from Manoa MOP. Most of the studies have been ecological baseline surveys in Hawaiian waters, but also have included surveys for underwater parks, and monitoring for coastal construction projects (Table 4). With the demise of NSF support for this kind of activity, MTW was born in 1982 and through four years has trained 129 students (Table 5), many of whom have secured employment and academic credit based on skills acquired from the workshops. Some 30% of the graduates have returned to one or more workshops to refine their skills, take on leadership responsibilities, and share their experience with new students.

TABLE 4. A chronology of scuba surveys by the University of Hawaii Marine Option Program*.

Date	Site	Report
1974	Papohaku, Molokai	Oishi 1975
1974	Oahu & Hawaii	Kimmerer & Durbin 1975
1975	Kauai	Baldwin et al. 1977
1976	Papohaku & Molokini	Anzai et al. 1979
1976	Kahoolawe	Akaka et al. 1977
1976	Honolua, Maui	Torricer et al. 1977
1978	Papohaku, Molokai	Tarr & Yamase 1980
1979	Molokai	Sanderson & Solonsky 1980
1980	Kahoolawe	Kawamoto et al. 1981
1981	Niihau	Kay et al. 1982
1982	Kona Coast	None
1983	Molokai	Manoa Mapworks 1984
1984	Richardson Bay, Hawaii	Mazarakis et al. 1984
1984	Olowalu, Maui	None
1985	Ahihi Bay, Maui	Orcutt, in prep.
1985	Halepalaoa, Lanai	Orcutt, in prep.
1985	Hanauma Bay, Oahu	Orcutt, in prep.

See figures 1 and 9 for locations.

* Many MOP students have participated in surveys throughout Hawaii and the Pacific which were organized by other units such as: Hawaii Division of Aquatic Resources, National Marine Fisheries Service, Hawaii Cooperative Fisheries Research Unit, National Geographic Society, Army Corps of Engineers, AECOS.

TABLE 5. Number of participants in Maui Transecting Workshops.

	Campus							
Year	Manoa	Hilo	Maui	Windward	Leeward	Honolulu	Staff	Total
1982	9	5	8	6	6	0	10	44
1983	13	3	6	2	2	0	3	29
1984	26	1	6	5	1	1	5	45
1985	14	4	1	9	0	1	11	40
TOTAL	62	13	21	22	9	2	29	158

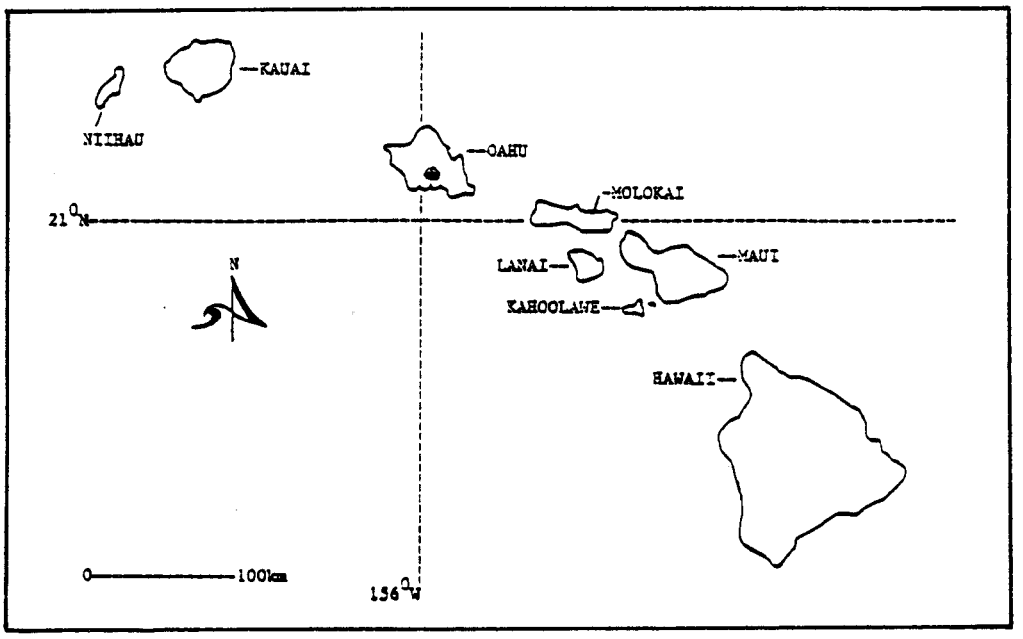

FIGURE 9. The major islands of Hawaii, sites of most MOP baseline surveys.

CONCLUSION

We have found this to be an effective training program for potential marine scientists. Although workshop graduates can not hire themselves out as independent environmental surveyors, they do have a basic orientation to this area of field work and are thus better prepared than many graduate students. Usually before summer projects commence, the selected students are put through a more extensive course in organism identification and train more intensively in the methods most appropriate to the goals of their particular project. Through this process some students discover that the rigors of field study, the long lists of species to know, or the drudgery of data analysis make marine science careers unattractive; there is more to "oceanography" than diving. For most, however, the program is a stimulant to return to the classroom with renewed interest in excelling academically. Many are rewarded solely by the knowledge that they were able to meet the mental and physical challenges and to establish friendships with fellow university students from around the state.

In addition, because of their experience in teamwork and leadership during the workshop and summer projects, a few key students step forward to take positions of responsibility within the MOP organization. Our best student coordinators (peer counselors), volunteers, and MTW organizers/ teachers/dive team leaders have come from the ranks of MTW graduates. Planning for MTW-V is underway.

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Appendix 2

From the years that I have been involved with Marine Option Program's workshops, several strengths and weaknesses have become clear to me. I shall elaborate, briefly, on some of the most important observations I have made. (important to me, anyway)

STRENGTHS

1) Student participation at all levels keeps everybody involved in organization, training and execution from the beginning to the end. This in turn provides a sense of cohesiveness to the workshop. It also allows the students to get experience in how difficult it can be orchestrate all the variables inherent to any enterprise.

2) The workshop is held annually. Although it would be easier to assemble a workshop package that acted as a blueprint for organizing such a course and to use it over and over during the year, with the continuing evolution of the workshop and the transient nature of its staff it is most practical to take a year to produce it. It is not a professionally run workshop, therefore, time must be alloted for the learning process each time around.

3) The workshop is practical. I know of no other transecting training program currently operating in the islands. Students completing this workshop can usually find experiential employment soon after they finish the training.

4) The community campus system is usually well, or at least proportionately, represented in the student ranks. This is one of two events annually that bring together the MOP students from all of its campuses. Being a multidisciplinary program, MOP students compare the varying advantages and disadvantages of their respective campus' activities.

5) Flexibility is unusually good in these workshops. That no two have been exactly alike keeps the program fresh. MOP is open-minded toward suggestions and is progressive in implementing new procedures or techniques in its training. A more efficient, professional workshop would comprimise this important aspect.

WEAKNESS

1) The largest deficiency lies, ironically, in the program's strength. Students leading students is fine except in the case where the experience of leading subordinates the experience of the first time transecting student. It takes some special understanding to be able to train a peer. In some cases, the understanding was assumed. This made for some rough times. Few people know how to present a training lecture. Fewer students were prepared for their responsibility than were not.

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